Reddening structure and metallicities of the Milky Way Bulge from VVV and 2MASS

Oscar A. Gonzalez
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  • Same as in the inner Bulge?
  • Along the mayor axis?

• Global picture of Bulge/Bar structure?
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Red clump giants as seen by VVV survey

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Outline of the talk

- Building up the data
- Obtaining reddening values and maps
- Tracing the bar with red clump giants
- Photometric metallicity distributions
- A look to the inner bulge (|b|<2)
The catalogs

- Multiband catalogs matching on sky positions
- Only sources with stellar flag in 3 bands
  - Range: $12 < K_s < 13$

A comparison with 2MASS for each tile and band
- Range: $12 < K_s < 13$

A final observed CMD corrected for saturation and fully consistent with 2MASS

$K_s > 12 \rightarrow$ VVV
$K_s < 12 \rightarrow$ 2MASS

\[ b = -4 \text{ (BW)} \]
Extinction

A Red Clump centered CMD
Tile b306 (b=-2)

Strong differential reddening implies a wide color distribution of the clump giants
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An empirical method based on the RC color

RC(J-Ks) in Baade's Window E(B-V)=0.55

The difference between the RC color in BW and any field l,b is a function of reddening

- Small fields to avoid differential reddening
- We assume same population than in BW
The maps (a look to the Bulge Minor axis)
The maps (a look to the Bulge Minor axis)
Using de-reddened RC magnitudes

Build the Luminosity function to study the Ks distribution of RC giants
Using de-reddened RC magnitudes

Build the Luminosity function to study the $K_s$ distribution of RC giants

Intrinsic magnitude of the RC is known for a given population

$M_k = -1.55$
$10\text{Gyr}$, Bulge-like $[\text{Fe/H}]$

Warning: Again assuming an homogeneous population
Using de-reddened RC magnitudes

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We can use all this to obtain clues for metallicity distributions

Photometric metallicities from CMDs in the absolute plane

(J-Ks)₀ Interpolation between GC ridge lines with known [Fe/H]
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Photometric metallicities from CMDs in the absolute plane

\[(J-Ks)_0\] Interpolation between GC ridge lines with known \([\text{Fe/H}]\)

-> Assigns \([\text{Fe/H}]\) to RGB stars from \(M_k > -4.5\) to the Tip of the RGB

A comparison to spectroscopic \([\text{Fe/H}]\) distributions

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Photometric metallicities from CMDs in the absolute plane

\((J-Ks)\) Interpolation between GC ridge lines with known \([Fe/H]\)

Assigns \([Fe/H]\) to RGB stars from \(M_k > -4.5\) to the Tip of the RGB

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0.4x0.4 deg metallicity map for the Bulge minor axis

The Bulge metallicity gradient as seen from photometry
A look to the inner Bulge

Applying the same technique we can characterize reddening properties in the very inner Bulge regions
A look to the inner Bulge

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More on this, soon....
Summary

• VVV data allows to trace the photometric properties of the RC in order to:
  • Obtain extinction maps sensitive to small scale variations
  • Trace the Bulge structure

• When coupled with 2MASS to correct for saturation it allows to:
  • Measure photometric metallicity distributions with resemble spectroscopic measurements
  • Trace the bulge metallicity gradient.

• The method was sucessful in reproducing properties along the minor axis and will be extended to other Bulge regions
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Thank you!

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